



## The Effect of Graphic Organizers on Iranian Students' Reading Comprehension

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### ABSTRACT

Among the different strategies for teaching reading comprehension, graphic organizers have received much attention by many researchers and practitioners. This study investigated the effects of graphic organizers on Iranian EFL learners' reading comprehension. Fifty male 3rd-year high school EFL learners were selected by means of the TOEFL test. They were divided into 2 groups of 25 homogeneous students: one experimental group and one control group. Participants were given a reading comprehension test before the treatment. Subsequently, the experimental group-Group A-received the graphic organizers intervention, and the control group-Group B-received a traditional reading instruction (translation-based). After an eight-week treatment, both groups were given the reading comprehension test again as a posttest. Statistical analysis showed a significant difference in the reading comprehension of the experimental group. It was concluded that the use of graphic organizers had positive effects on the L2 learners' reading comprehension.

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### Introduction

#### Literature Review

Graphic organizers are visual, and spatial displays designed to facilitate the teaching and learning of textual materials through the "use of lines, arrows, and a spatial arrangement that describe text content, structure, and key conceptual relationship" (Darch & Eaves, 1986, p. 310). Gill (2007) defined graphic organizers as visual and spatial illustrations which show the relationships existing between concepts of a text and their effectiveness covers almost all kinds of subject areas. Graphic organizers are "visual displays teachers use to organize information in a manner that makes the information easier to understand and learn" (Meyen, Vergason, & Whellan, 1996, p. 132). Also, Jones, Pierce, and Hunter (1988/1989) stated that "a good graphic organizer can show the key parts of a whole and their relations, thereby allowing a holistic understanding that words alone can't convey" (p. 21).

In other studies, "graphic organizers have taken the form of anything from hierarchical listing of vocabulary terms to elaborate visual-spatial displays with accompanying descriptions and phrases" (Griffin & Tulbert, 1995, p. 86). Graphic organizers can come in a number of different forms, from illustration of objects to structures including hierarchical and cyclical ones (Ciascai, 2009). Although it is thought that graphic organizers can be beneficial only to visual learners, as a matter of fact, different learners with different learning styles can considerably benefit from using these organizers (ibid, 2009). Notwithstanding any special names that graphic organizers are labeled (e.g., semantic map, structured overview, web, concept map, semantic organizer story map, etc.), all graphic organizers are visual illustrations of knowledge. They arrange and also single out important concepts and structures of a text (Bromley, Irwin-DeVitis, & Modlo, 1995).

#### Schema Theory

Schemata are dynamic cognitive structures in mind that contain learners' existing knowledge (Winn & Snyder, 1996). The schema theory is a cognitive theory which indicates that when a person is reading a text, his or her rate of learning depends on two factors: One factor is new information which is

received from the text, and another is his or her previously learned knowledge (Anderson & Pearson, 1984). The most significant point related to the schema theory is "information that fits into a (student's) existing schema is more easily understood, learned, and retained than information that does not fit into an existing schema" (Slavin, 1991, p. 164). Based on the schema theory, learners get new materials and store them in their existing channels, structures, or hierarchies of their mind (Dye, 2000). Dunston (1992), regarding the effectiveness of graphic organizers, states that they "organize information to be learned, connect it to what is known, and allow the reader to interact with the text" (p. 59). Moreover, as Ausubel (1963) mentioned, graphic organizers can be very effective techniques to activate learners' existing knowledge and then establish connections between their background knowledge and the new information. Dye (2000) also noted that "the graphic organizer has its roots in schema theory" (p. 72).

According to Guastello, Beasley, and Sinatra (2000), a vital task of teachers is to ensure that L2 learners have enough background knowledge related to the new information and also provide L2 learners with special tools or techniques to link up the new information to their previously learned knowledge. They justified their claims by this reason that if students do not have enough background knowledge to connect it with the new information, they may not be able to comprehend the new materials. Thus, "our ability to understand and remember new information is critically depends upon what we already know and how our knowledge is organized" (Clifton & Slowiaczek, 1981, p. 142). Through applying graphic organizers, L2 learners can make linkage between new materials and their prior knowledge and also creating appropriate schema for anchoring new concepts to them (Guastello et al., 2000).

#### Dual Coding Theory

According to the dual coding theory (Paivio, 1986), there are two highly interconnected, but separate, systems of information processing in our memory. One system is the verbal system that deals with linguistic codes—language—and the other is the visual system which deals with visual codes—images. In the case of presenting information both visually and

verbally to the memory, we can witness considerable memory enhancements (Anderson & Bower, 1973; Denis & Mellet, 2002; Just, Newman, Keller, McEleney, & Carpenter, 2004). Retrieving and internalizing this kind of information is very easy for L2 learners because instead of one mental representation-visual or mental-two simultaneous mental representations-visual and verbal-are available for them (Paivio, 1986).

Considering what is mentioned by the researchers in the above statements, graphic organizers are directly applicable to the dual coding theory because almost all types of graphic organizers involve both verbal and visual displays (Anderson & Bower, 1973; Denis & Mellet, 2002; Just et al., 2004). Moreover, the findings of several studies (e.g., Alverman & Boothby, 1986; Ritchie & Volkl, 2000; Robinson & Schraw, 1994) confirm this point that graphic organizers really enhance our memory of a text because these organizers do separate processing in the brain, which belong to different channels, simultaneously.

### **Cognitive Load Theory**

“Cognitive load is a term used to describe the amount of information processing expected of the learner. Intuitively, it makes sense that the less cognitive load a learner has to carry, the easier learning should be” (Chalmers, 2003, p. 598). The cognitive load theory states that if we can reduce the amount of variables (e.g., unnecessary or extraneous cognitive learning load) that put obstacles in the way of converting working memory to long-term memory, we can consequently optimize learners’ comprehension in a significant way (Sweller, 1988). Due to the fact that the working memory’s capacity is low, based upon what Sweller mentioned, the usefulness of different learning techniques depends on their capability to decrease the amount of excessive and unessential cognitive load on this memory. Kintsch and van Dijk (1978) noted that through eliminating unimportant and extraneous details, graphic organizers emphasize more important points, structures, and relationships of content and facilitate learning process. Moreover, what has changed the various viewpoints of a number of instructional designers towards graphic organizers was the point that in the light of graphic organizers, L2 learners did not have to spend much time to get the intended message and to put the information in appropriate locations (Robinson & Schraw, 1994).

### **Methodology**

#### **Participants and Materials**

Sixty Iranian fifth-grade high school students participated in the study. They were all male and aged between 17 and 18. They were studying in the high schools of Ahvaz. Initially, from the 60 students who were tested through the TOEFL test, 10 students whose scores were 1 standard deviation above or below the mean were excluded from the study. Then they were divided into two homogenous groups of 25. A reading comprehension pretest was used to examine the participants’ reading comprehension ability before the experiment. The texts were obtained from a book named *Select Reading Elementary*. The pretest which comprised 30 questions was extracted from the *Testing Program of Select Reading Elementary*.

#### **Procedure**

The experiment took an 8-week schedule to complete. Before the experiment, the TOEFL test was administered to ensure the homogeneity of the two classes in terms of average language proficiency, and the participants were divided into two classes of 25. Then, the pretest with 30 items was given to make sure that the participants were also homogeneous in terms of their reading comprehension ability and as a basis for measuring

their improvement during the term. The time given for this test was 90 minutes. The correct answer for each item received 1 point, and there was no penalty for false responses.

In the first session of the experiment, the teacher explained the facilitative impact of graphic organizers and continued to teach reading comprehension via these organizers during the following sessions. He instructed the students to consider the following points in order to come up with appropriate graphic organizers: “Read each text carefully, and then, find the important concepts embedded in each paragraph and finally, according to the relationship between those concepts, draw the appropriate graphic organizer.” Next, the participants were given a text to read because they were not capable to create the suitable graphic organizers they were expected to. Meanwhile, the teacher was walking around the participants to see how they developed the graphics. Finally, the appropriate graphic organizers were provided by the teacher on the board. The teacher asked the participants to discuss the text in order to check their comprehension. In the other sessions of the experiment, the same work was done.

In Group B (i.e., the control group), traditional/mainstream methods of instruction like using the translation technique were employed. In the final session of the experiment, the posttest was administered, and the reading comprehension ability of the participants in the two groups was tested.

### **Results**

The reading comprehension ability of the participants, as measured by the posttest was compared across the two groups. The analyses were done using Statistical Package for Social Science (SPSS Inc., 2009).

Prior to the analysis of the results, the participants’ scores on the TOEFL test were compared across the two groups to make sure that the two groups were homogeneous. To achieve this goal, an independent samples t-test was conducted. The results from the independent samples t-test are reported in Table 1:

The results of the independent samples t-test, reported in Table 1, revealed that the difference between the proficiency scores of the two groups was not statistically significant,  $t(51) = .457$ ,  $p = .650$  (2-tailed). Therefore, there was not any significant difference between the participants in Groups A and B with respect to their performance on the TOEFL proficiency test. This suggested that participants of the two groups were homogeneous at the beginning of the experiment.

In order to investigate the effect of graphic organizers on the L2 learners’ reading comprehension, paired samples t-tests were run on the pretest and posttest scores for both the experimental and control groups. The minimum alpha for confirmation of the research hypothesis was set at .05. The results from the paired samples t-tests are reported in Table 2:

Considering the reading comprehension scores of Group B, the mean scores of the posttest ( $M = 12.96$ ), and the pretest ( $M = 12.80$ ) were roughly the same. But, with respect to Group A, the reading scores were not equivalent for the two tests, and the mean score of posttest ( $M = 15.08$ ) was higher than the mean score of pretest ( $M = 12.28$ ) in this group. Although the mean score of the two tests were different, it was not clear whether this difference was significant or not. Therefore, paired samples t tests were carried out on the pretest and posttest scores (see Table 2).

The results of the t test in Table 2 revealed that there was a statistically significant difference between the participants’ performance on the reading comprehension pretests and posttests in Group A,  $t(24) = -8.08$ ,  $p < .000$  (2-tailed).

**Table 1. Independent Sample T-Test for TOEFL Proficiency Test**

		Levene's Test for Equality of Variances		t-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
TOEFL Proficiency Test	Equal Variances Assumed	.140	.710	.457	51	.650	.880	1.92	-2.99	4.75
	Equal Variances Not Assumed			.456	50.82	.650	.880	1.92	-2.99	4.75

**Table 2. Paired Samples t Tests for the Pretest and Posttest Scores**

Groups		Paired Difference						df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T		
					Lower	Upper			
Group A	Pretest-Posttest	-2.80	1.73	.346	-3.515	-2.085	-8.08	24	.000
Group B	Pretest-Posttest	-.160	1.14	.229	-.632	.312	-.700	24	.491

**Table 3. Independent Samples t Test for the Posttests Scores**

		Levene's Test for Equality of Variances		t-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Posttest	Equal Variances Assumed	.052	.821	3.49	48	.001	2.12	.607	.900	3.34
	Equal Variances Not Assumed			3.49	47.78	.001	2.12	.607	.900	3.34

Therefore, the participants' reading comprehension improved significantly after receiving instruction using the graphic organizers. Considering the difference between the mean scores of the two groups on the posttest an independent samples t test was used to analyze the data. The results from the independent samples t test are displayed in Table 3.

The results of the independent samples t test, presented in Table 3, revealed that the difference between the posttest scores of Groups A and B was statistically significant,  $t(48) = 3.49$ ,  $p = .001$  (2-tailed). This suggested that, with respect to the posttest scores, the participants in Group A outperformed those who were in Group B.

#### Discussion/Conclusion

This study reaffirmed the findings of Hawk (1986) that life science students who received training in graphic organizers got higher scores on the pretest in comparison to the control group. The results of this study are in tune with Tang's (1992) who noted that the dual coding functions of graphic organizers opened up this opportunity for the learners to have both visual and verbal representations of the information. Consequently, in this way, the L2 learners were able to recall a considerable amount of the information. Additionally, the findings of this study are consistent with those of Öztürk's (2012) who found that a 12-week treatment in the experimental group-those who

received training in graphic organizers-had positively affected their reading comprehension achievement.

It should be mentioned that the results of some other studies (Bean, Singer, Sorter, & Frazee, 1986; Griffin, Malone, & Kameenui, 1995; Simmons, Griffin, & Kameenui, 1998) are at odds with the results of the present study because they failed to demonstrate an improvement in the learners' comprehension, and they found graphic organizers training no more effective than instruction via other strategies.

There are a host of reasons that may justify the findings of this study: First, because of the dual coding functions of graphic organizers, L2 learners should be provided with two simultaneous mental representations-visual and verbal-of the information and, as a consequence, information will be more easily learned and comprehended by the learners (Paivio, 1986).

Second, while employing graphic organizers, L2 learners are not forced to learn all the components of the texts. They will gradually learn to have important points and concepts of the texts in their minds and eliminate the unimportant parts. By doing so, the amount of the cognitive load on their memory will be decreased, and the learning process will be facilitated (Kintsch & van Dijk, 1978). This point is related to the cognitive load theory which lends support to the use of graphic organizers.

Third, according to Ausubel (1968), schemas are existing framework of categories in the mind and the places where the

information is filled in. Additionally, Dye (2000) mentions that "schema theory states that a person takes new information and stores it in preexisting hierarchies or channels" (p. 74). Graphic organizers help L2 learners to build appropriate schemas through making linkages between the new information and the existing information in the minds of students that, consequently, in this environment, meaningful learning occurs.

Reading comprehension, as Öztürk (2012) mentions, has proved to be a complicated skill for many learners, in particular those who read in an L2. We noted that vocabulary, culture difference, and text structure are among those difficulties which may hinder the way of comprehending the texts for L2 learners. Graphic organizers can be very effective tools to assist L2 learners in overcoming some of those difficulties. For example, they can be so influential in enhancing their comprehension of reading texts with different text structures (ibid, 2012).

By using graphic organizers, readers will be able to extract the necessary information from the materials and put them in suitable templates that are built by the readers themselves. Moreover, graphic organizers will give the readers the ability to transfer this skill to other different contexts (Rajan & Sam, 2013).

As a whole, as the data analysis revealed, graphic organizers are effective tools to improve L2 learners' understanding in reading comprehension and also encourage them to read even intricate English texts. Additionally, utilizing graphic organizers as a strategy for reading instruction has proved to be more efficient than other strategies such as translation.

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